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# EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIRMENT

## DEVELOPMENT OF RENAL BIOASSAYS IN LABORATORY ANIMALS

### DIRECTORY OF INSTITUTIONS/INDIVIDUALS Final Report

Purna Greenaway, Awadh Singh

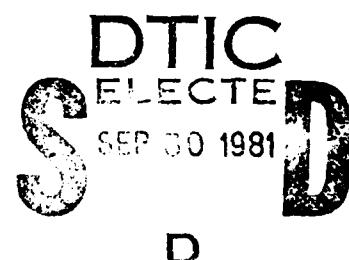
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McLean, Virginia 22102

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US Army Medical Bioengineering Research and Development Laboratory  
Fort Detrick, Maryland 21701



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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) MITRE has been requested by the U.S. Army Medical Bioengineering Research and Development Laboratory to identify and evaluate short-term bioassays which have demonstrated ability to evaluate and predict renal impairment resulting from toxicant exposures. This directory is a companion to <u>Selected Short-Term Renal Toxicity Tests</u> , which describes the available renal testing protocols and assesses their suitability for a screening program. This directory catalogues the organizations currently engaged in renal bioassay utilization or development and provides information concerning		

specific measurements performed, test systems employed, compounds tested, requirements for anesthesia and terminal nature of the test.

The companion report to this directory reviews the literature on test procedures for determining effects on the kidneys and other components of the renal system. The procedures are discussed in sections on morphology, glomerular function, tubular function, intrarenal hemodynamics, and biochemistry. Criteria for evaluating these procedures are given, and a two-tiered testing system is recommended for a chemical renal toxicity screening program.

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## EXECUTIVE SUMMARY

The MITRE Corporation, Metrek Division is currently assisting the United States Army Medical Bioengineering Research and Development Laboratory (USAMBRDL) in the development of a hierarchical short-term testing scheme to screen substances for functional or morphological impairment in animal test systems. Effects in four organ systems--pulmonary, hepatic, renal and cardiovascular--are being considered.

As part of this effort, Metrek has been asked to prepare directories of organizations and individuals presently involved in the development and/or utilization of tests applicable to toxicity screening. This directory serves as a companion document to the report, Evaluation of Short-Term Bioassays to Predict Functional Impairment: Selected Short-Term Renal Toxicity Tests, which presents information on the available tests for the renal system and recommends those tests which are suitable for use in a screening program.

Entries in each directory for several organizations currently involved in the organ bioassay use or development include at least one contact individual's name, which appears under the organization name and address at the top of the page. These are the people who, during the process of directory compilation, described either their activities or the activities of their group regarding organ toxicity testing, and thereby provided the information presented in the entry.

The information provided includes the specific tests and observations performed; the test systems utilized (e.g., experimental animals or tissues in vitro); the substances administered or conditions established to elicit toxic response (e.g., stress); the use of anesthesia, and the terminal nature of the tests conducted.

In order to facilitate use and the processes of amending and adding to the directory, it has been arranged in alphabetical order by organization. In order to further simplify use of the directory, three indexes have been prepared and are included as appendices. The first, Appendix A, is an alphabetical index of tests performed by each organization engaged in developing, performing or refining the tests noted. Appendix B is an alphabetical index of species utilized and all the organizations employing each test system. These are further divided by tests performed. In this way it is possible to ascertain which organizations perform particular bioassays in a specific test system. Appendix C is an alphabetical index of the individuals mentioned in the directory, and the organization with which they were affiliated when contacted.

The objective of this directory is to provide a readily usable guide to that segment of the scientific community currently active in organ system toxicity testing in animals. Because research associate and graduate student positions are often temporary in nature, a deliberate attempt was made to exclude these individuals from the directory. Their efforts, however, are likely to be

represented by activities associated with their organization, as in most cases these individuals are conducting research under the auspices of someone more senior and more permanently allied with the organization, who was included in the directory. In addition, there are individuals who were active in toxicity testing at one time but are no longer; these have also been omitted from the directory. The efforts of many of those who are not currently active, but were involved over a period of many years and distinguished themselves in the fields, are reflected in the report Selected Short-Term Renal Toxicity Tests.

Some of the entries in the directory may be less detailed than others, and less specific in the detail that is presented. In addition, the information presented for an organization may not be reflective of all the ongoing efforts at the organization. This is due largely to the reluctance of some individuals contacted to communicate the information and, in small part, to an inability to contact a few individuals at the time this directory was being compiled. The information in the directory was selected to provide an immediate indication of the practices of each organization concerning some issues of importance when designing a screening program. Much of this information is discussed in greater detail in the report Selected Short-Term Renal Toxicity Tests.

## FOREWORD

This Directory was compiled by MITRE staff by means of a survey of the recent literature, and by discussions with leaders in the field and other personal contacts. We are grateful to all those who responded so patiently to our questions regarding their activities. All of the "contact persons" were given an opportunity to review the information relating to their organization. We recognize there may be inadvertent omissions for which we offer our sincere apologies.

Citations of organizations and trade names in this report do not constitute an official Department of the Army endorsement or approval of the products or services of these organizations.

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DIRECTORY OF ORGANIZATIONS PRESENTLY  
INVOLVED IN UTILIZATION OR DEVELOPMENT  
OF RENAL TESTS IN LABORATORY ANIMALS

ORGANIZATION:

BAYLOR COLLEGE OF MEDICINE  
TEXAS MEDICAL CENTER  
HOUSTON, TEXAS 77030

J. R. MITCHELL  
PROFESSOR OF MEDICINE  
G. CORCORAN  
RESEARCH ASSISTANT PROFESSOR  
(713) 790-4721

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY

TUBULAR FUNCTION:

SECRETIVE TEST

IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE  
TECHNIQUE)

RENAL HEMODYNAMICS: RENAL BLOOD FLOW MEASUREMENT

BIOCHEMICAL DAMAGE INDICATORS:

DRUG METABOLIC STUDIES

RENAL TISSUE HOMOGENATE PREPARATIONS

URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

MICE, RATS, GOLDEN HAMSTERS

COMPOUNDS TESTED:

2-SUBSTITUTED FURANS AND THIOPHENES, INCLUDING FUROSEMIDE AND  
CEPHALORIDINE, VARIOUS DRUGS AND AROMATIC AND ALIPHATIC  
ENVIRONMENTAL TOXICANTS

TERMINAL:

BOTH SERIAL AND TERMINAL TESTS ARE PERFORMED

ORGANIZATION:

DARTMOUTH MEDICAL SCHOOL  
DEPARTMENT OF INTERNAL MEDICINE  
HANOVER, NEW HAMPSHIRE 03755

H. VALTIN  
PROFESSOR OF MEDICINE  
(603) 646-2207

TESTS PERFORMED:

A WIDE VARIETY OF FUNCTIONAL TESTS

TEST SYSTEMS UTILIZED:

UNANESTHETIZED RATS

COMPOUNDS TESTED:

VARIOUS DRUGS

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

DARTMOUTH MEDICAL SCHOOL  
DEPARTMENT OF PHARMACOLOGY  
HANOVER, NEW HAMPSHIRE 03755

G. H. MUDGE  
PROFESSOR OF PHARMACOLOGY  
(603) 646-2715

TESTS PERFORMED:

GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (INULIN AND CREATININE CLEARANCE; DISAPPEARANCE OF RADIOACTIVE SUBSTANCES)

RENAL HEMODYNAMICS: RENAL BLOOD FLOW (PAH CLEARANCE)

TUBULAR FUNCTION: URINARY CONCENTRATING ABILITY (OSMOLALITY)  
SECRETIVE TEST (URINARY EXCRETION OF ELECTROLYTES)

BIOCHEMICAL DAMAGE INDICATORS:

DRUG METABOLIC STUDIES

RENAL TISSUE HOMOGENATE PREPARATIONS

TEST SYSTEMS UTILIZED:

MICE, RATS, GUINEA PIGS, HAMSTERS, DOGS

COMPOUNDS TESTED:

VARIOUS DRUGS, RADIOPAQUE AGENTS

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

DARTMOUTH MEDICAL SCHOOL  
DEPARTMENT OF ANATOMY  
HANOVER, NEW HAMPSHIRE 03755

W. M. LAYTON, JR.  
PROFESSOR OF ANATOMY  
(603) 636-2732

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT MICROSCOPY AND ELECTRON  
MICROSCOPIC STRUCTURAL STUDIES

GLOMERULAR FUNCTION:

GLOMERULAR FILTRATION RATE (UREA CLEARANCE)  
GLOMERULAR DYSFUNCTION (PHENOSULFONEPHTHALEIN [PSP] AND  
URINARY PROTEIN MEASUREMENT)

TUBULAR FUNCTION:

SECRETIVE TEST (PAH TRANSPORT MAXIMUM MEASUREMENT)  
URINARY CONCENTRATING ABILITY (OSMOLALITY)

TESTS SYSTEMS UTILIZED:

RATS, DOGS

COMPOUNDS TESTED:

VARIOUS DRUGS

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

DEPARTMENT OF HEALTH AND WELFARE  
HEALTH PROTECTION BRANCH  
VANCOUVER 1, B.C., CANADA

G. H. HIRSCH  
CHIEF, DRUG LABORATORIES  
(604) 666-3802

TESTS PERFORMED:

GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (CREATININE  
AND UREA CLEARANCE)

TUBULAR FUNCTION:

SECRETIVE TEST

IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE TECH-  
NIQUE)

TEST SYSTEMS UTILIZED:

RATS, RABBITS, GUINEA PIGS, DOGS

COMPOUNDS TESTED:

URANYL NITRATE, POTASSIUM DICHROMATE, GENTAMICIN,  
TETRAMYCIN, SEVERAL HEAVY METALS, HALOGENATED HYDROCARBONS,  
VARIOUS DRUGS

TERMINAL:

MOSTLY TERMINAL TYPE OF EXPERIMENTS

ORGANIZATION:

DEPARTMENT OF HEALTH AND WELFARE  
HEALTH PROTECTION BRANCH  
FOOD DIRECTORATE  
TUNNEY'S PASTURE - NEW RESEARCH CENTER  
OTTAWA, ONTARIO, CANADA

I. C. MUNRO  
DIRECTOR, BUREAU OF CHEMICAL SAFETY  
(613) 593-4871

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR DYSFUNCTION (URINARY PROTEIN  
MEASUREMENT)

TUBULAR FUNCTION:

SECRETIVE TEST (URINARY EXCRETION OF ELECTROLYTES)  
GENERAL TUBULAR DAMAGE (MICROCRYSTALS AND OTHER URINARY  
SEDIMENT EXAMINATION)

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

SODIUM AND CALCIUM SACCHARIN, SODIUM CYCLAMATE

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO I. C. MUNRO, D. L. ARNOLD, B. STAVRIC, B. T.  
COLLINS AND P. F. McGuIRE ARE INVOLVED IN RENAL TESTING RESEARCH  
PROGRAMS AT THIS INSTITUTION

ORGANIZATION:

DUKE UNIVERSITY MEDICAL CENTER  
DIVISION OF NEPHROLOGY  
DURHAM, NORTH CAROLINA 27706

V. W. DENNIS  
ASSOCIATE PROFESSOR  
(919) 684-5414

TESTS PERFORMED:

GLOMERULAR FUNCTION:

GLOMERULAR FILTRATION RATE (INULIN AND CREATININE CLEARANCE)  
GLOMERULAR DYSFUNCTION (BLOOD UREA NITROGEN [BUN] AND URINARY  
PROTEIN MEASUREMENT)

TUBULAR FUNCTION:

URINARY CONCENTRATING ABILITY (URINE OSMOLALITY)  
SECRETIVE TEST (URINARY EXCRETION OF ELECTROLYTES)  
BIOCHEMICAL DAMAGE INDICATOR: PLASMA RENIN MEASUREMENT

TEST SYSTEMS UTILIZED:

RATS, RABBITS, HUMANS

COMPOUNDS TESTED:

HEAVY METALS ESPECIALLY MERCURY COMPOUNDS; CLINICAL TESTING IN  
HUMANS IS ALSO PERFORMED

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO V. W. DENNIS, R. R. ROBINSON, R. A. GUNMAN AND  
J. R. CLAPP ARE ALSO INVOLVED IN RENAL TESTING RESEARCH PROGRAMS  
AT THIS INSTITUTION

ORGANIZATION:

FOOD AND DRUG RESEARCH LABORATORIES  
P.O. BOX 107  
WAVERLY, NEW YORK 14892

F. J. KOSCHIER  
SENIOR TOXICOLOGIST  
(607) 565-2931

TESTS PERFORMED:

TUBULAR FUNCTION:

SECRETIVE TESTS (URINARY DISTRIBUTION AND EXCRETION OF ELECTROLYTES)

IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE TECHNIQUE AND ISOLATED PERFUSED TUBULES)

URINARY CONCENTRATING ABILITY (URINE OSMOLALITY)

RENAL HEMODYNAMICS: RENAL PLASMA FLOW

BIOCHEMICAL DAMAGE INDICATORS:

RENAL METABOLIC STUDIES

URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

VARIOUS HERBICIDES AND INSECTICIDES

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

GEOGETOWN UNIVERSITY  
SCHOOL OF MEDICINE AND DENTISTRY  
DEPARTMENT OF NEPHROLOGY  
WASHINGTON, D.C. 20007

G. E. SCHREINER  
HEAD OF DEPARTMENT  
(202) 625-7257

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION:

GLOMERULAR FILTRATION RATE (CREATININE AND INULIN CLEARANCE)  
GLOMERULAR DYSFUNCTION (BUN AND URINARY PROTEIN MEASUREMENT)

TUBULAR FUNCTION:

SECRETIVE TEST

IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE  
TECHNIQUE)

URINARY CONCENTRATING ABILITY (OSMOLALITY AND SPECIFIC  
GRAVITY)

RENAL HEMODYNAMICS: RENAL BLOOD FLOW (PAH CLEARANCE)

BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

MICE, RATS, GUINEA PIGS, DOGS, MONKEYS, HUMAN (ADULTS AND  
CHILDREN) BIOPSIES

COMPOUNDS TESTED:

VARIOUS DRUGS, CANCER CAUSING AGENTS, HEAVY METALS (e.g.,  
MERCURY, CHLORIDE)

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

BESIDES G. E. SCHREINER, H. PREUSES, W. P. ARGY, JR., L. DIAMOND  
AND J. WINCHESTER ARE ALSO INVOLVED IN RENAL TESTING PROGRAMS AT  
THIS INSTITUTION

ORGANIZATION:

HARVARD MEDICAL SCHOOL  
BOSTON, MASSACHUSETTS 02115

A. L. LAGE  
ASSISTANT PROFESSOR OF VETERINARY MEDICINE  
(617) 732-1000

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY  
GLOMERULAR FUNCTION:

GLOMERULAR FILTRATION RATE (CREATININE CLEARANCE)  
GLOMERULAR DYSFUNCTION (PSP EXCRETION)

TUBULAR FUNCTION: URINARY CONCENTRATING ABILITY (OSMOLALITY AND  
SPECIFIC GRAVITY)

TEST SYSTEMS UTILIZED:

RATS, GUINEA PIGS, RABBITS, MONKEYS

COMPOUNDS TESTED:

MOSTLY UNANESTHESIZED ANIMALS ARE USED FOR THESE TESTS; HOWEVER,  
A FEW STUDIES ARE BEING DONE WITH ANESTHESIZED ANIMALS

TERMINAL:

SERIAL; HOWEVER, SOME MONKEYS ARE TERMINATED AND LIGHT MICRO-  
SCOPY IS PERFORMED

ORGANIZATION:

ICI AMERICAS, INC.  
BIOMEDICAL RESEARCH DEPARTMENT  
WILMINGTON, DELAWARE 19897

S. T. KAU  
HEAD, RENAL PHARMACOLOGY SECTION  
(302) 575-2501

TESTS PERFORMED:

GLomerular Function: GLomerular Filtration Rate (INULIN CLEARANCE)

TUBULAR FUNCTION:

SECRETIVE TEST (URINARY EXCRETION OF ELECTROLYTES)

IN VITRO EVALUATION OF RENAL TRANSPORT (ISOLATED PERFUSED TUBULES)

URINARY CONCENTRATING ABILITY (OSMOLALITY)

RENAL HEMODYNAMICS: RENAL BLOOD FLOW (PAH CLEARANCE)

BIOCHEMICAL DAMAGE INDICATORS: MEASUREMENTS OF ARTERIAL PCO<sub>2</sub> AND CORRELATIONS WITH CARBONURIA

TEST SYSTEMS UTILIZED:

MICE, RATS, RABBITS, DOGS

COMPOUNDS TESTED:

VARIOUS DRUGS AND COMPOUNDS

TERMINAL:

ONLY SERIAL

ORGANIZATION:

INDIANA UNIVERSITY  
SCHOOL OF MEDICINE  
DEPARTMENT OF NEUROPATHOLOGY  
INDIANAPOLIS, INDIANA 46202

V. PATEL  
ASSOCIATE PROFESSOR  
(317) 264-4662

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION:  
    GLOMERULAR FILTRATION RATE (CREATININE AND UREA CLEARANCE)  
    GLOMERULAR DYSFUNCTION (URINARY PROTEIN MEASUREMENT)  
TUBULAR FUNCTION: URINARY CONCENTRATING ABILITY (OSMOLALITY)  
BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

GENTAMICIN, MERCURY

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO V. PATEL, F. C. LUFT, W. ZEMAN AND S. A. KLEIT  
ARE INVOLVED IN RENAL TESTING AT THIS INSTITUTION

ORGANIZATION:

MEDICAL COLLEGE OF VIRGINIA  
DEPARTMENT OF MEDICINE  
RICHMOND, VIRGINIA 23298

D. E. OKEN  
PROFESSOR OF MEDICINE  
(804) 786-9682

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: HISTOPATHOLOGY

GLOMERULAR FUNCTION:

  GLOMERULAR FILTRATION RATE (INULIN AND UREA CLEARANCE)

  GLOMERULAR BLOOD FLOW

  GLOMERULAR DYSFUNCTION (URINARY PROTEIN MEASUREMENT)

BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

MOSTLY HEAVY METALS SUCH AS MERCURY CHLORIDE, SODIUM DICHROMATE,  
ETC.

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

MICHIGAN STATE UNIVERSITY  
DEPARTMENT OF PHARMACOLOGY  
B420 LIFE SCIENCE BUILDING  
EAST LANSING, MICHIGAN 48824

J. B. HOOK  
PROFESSOR OF PHARMACOLOGY  
(517) 353-3718

TESTS PERFORMED:

GLOMERULAR FUNCTION:

GLOMERULAR FILTRATION RATE (CREATININE AND UREA CLEARANCE)  
GLOMERULAR DYSFUNCTION (BUN, URINARY PROTEIN AND PSP  
MEASUREMENT)

TUBULAR FUNCTION:

SECRETIVE TEST  
IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE  
TECHNIQUE)  
URINARY CONCENTRATING ABILITY (OSMOLALITY)

TEST SYSTEMS UTILIZED:

MICE, RATS

COMPOUNDS TESTED:

VARIOUS NEPHROTOXIC AGENTS

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO J. B. HOOK, K. M. McCORMACK, D. E. RICKERT AND  
V. L. SANGER ARE ALSO INVOLVED IN RENAL TESTING PROGRAMS AT THIS  
INSTITUTION

ORGANIZATION:

MOUNT DESERT ISLAND BIOLOGICAL LABORATORIES  
P.O. BOX 25  
SALISBURY COVE, MAINE 04672

B. SCHMIDT-NIELSEN  
DEPUTY DIRECTOR  
(207) 288-4690

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
TUBULAR FUNCTIONS

TEST SYSTEMS UTILIZED:

RATS, GOLDEN HAMSTERS

COMPOUNDS TESTED:

LISAMINE GREEN DYE

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

NATIONAL INSTITUTES OF HEALTH  
NATIONAL HEART AND LUNG INSTITUTE  
LABORATORY OF KIDNEY AND ELECTROLYTE METABOLISM  
BETHESDA, MARYLAND

M. B. BURG  
CHIEF OF LABORATORIES  
(301) 496-3187

TESTS PERFORMED:

GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (INULIN CLEARANCE)

TUBULAR FUNCTION:

SECRETIVE TEST

IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE TECHNIQUE AND ISOLATED PERFUSED TUBULES)

BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

RABBITS

COMPOUNDS TESTED:

ORGANIC ACIDS AND BASES, ELECTROLYTES

TERMINAL:

PROCEDURES USED ARE TERMINAL EXCEPT URINALYSIS AND INULIN CLEARANCE TESTS

REMARKS:

ISOLATED PERFUSED SINGLE TUBULE TECHNIQUE IS NOT SUITABLE FOR ROUTINE OR SCREENING PURPOSES

ORGANIZATION:

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES  
NATIONAL TOXICOLOGY PROGRAM  
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

W. M. KLUWE  
STAFF FELLOW  
(919) 541-2690

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: HISTOPATHOLOGY  
GLOMERULAR FUNCTION: MEASUREMENT OF GLOMERULAR FILTRATION RATE  
(CREATININE CLEARANCE)  
TUBULAR FUNCTION:  
  SECRETIVE TEST  
    IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE  
    TECHNIQUE)  
  URINARY CONCENTRATING ABILITY (OSMOLALITY AND SPECIFIC  
  GRAVITY)  
BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

MICE, RATS

COMPOUNDS TESTED:

HEAVY METALS, HALOGENATED HYDROCARBONS

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

HISTOPATHOLOGIC EXAMINATION OF THE RENAL TISSUES IS THE BEST DETERMINANT OF RENAL DAMAGE; HOWEVER, IT PROVIDES LITTLE INFORMATION CONCERNING RENAL FUNCTION. GAMMA-GLUTAMYL TRANSPEPTIDASE IS PRESENT IN SUFFICIENT AMOUNTS IN THE URINE OF RODENTS TO INDICATE RENAL DAMAGE

ORGANIZATION:

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES  
LABORATORY OF ENVIRONMENTAL TOXICOLOGY  
P.O. BOX 12233  
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

B. A. FOWLER  
RESEARCH BIOLOGIST AND HEAD OF RENAL AND  
INTERCELLULAR FUNCTION AND TOXICOLOGY GROUP  
(919) 541-3269

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION:  
    GLOMERULAR FILTRATION RATE (CREATININE AND UREA CLEARANCE)  
    GLOMERULAR DYSFUNCTION (URINARY PROTEIN AND PORPHYRIN  
        MEASUREMENT)  
BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

MICE, RATS, RABBITS

COMPOUNDS TESTED:

MOSTLY HEAVY METALS SUCH AS MERCURY, CADMIUM, LEAD, ARSENIC,  
ETC.

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

BESIDES B. A. FOWLER, J. S. WOODS IS ALSO ACTIVELY INVOLVED  
IN RENAL TESTING PROGRAMS.

ORGANIZATION:

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES  
P.O. BOX 12233  
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

R. GOYER  
DEPUTY DIRECTOR  
(919) 541-3201

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION:  
    GLOMERULAR FILTRATION RATE (CREATININE CLEARANCE)  
    GLOMERULAR DYSFUNCTION (URINARY PROTEIN MEASUREMENT)  
BIOCHEMICAL DAMAGE INDICATORS

TEST SYSTEMS UTILIZED:

MICE, RATS

COMPOUNDS TESTED:

CADMUM AND ZINC CHLORIDES, CADMUM METALLOTHEONEIN

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

NORTH CAROLINA CENTRAL UNIVERSITY  
DEPARTMENT OF BIOLOGY  
DURHAM, NORTH CAROLINA 27707

V. CLARK  
ASSOCIATE PROFESSOR  
(919) 683-6248

TESTS PERFORMED:

GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (URINARY PROTEIN MEASUREMENT)  
TUBULAR FUNCTION: URINARY CONCENTRATING ABILITY  
BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

HEAVY METALS, ESPECIALLY CADMIUM

TERMINAL:

ONLY SERIAL

ORGANIZATION:

OHIO STATE UNIVERSITY  
COLLEGE OF VETERINARY MEDICINE  
DEPARTMENT OF VETERINARY PHYSIOLOGY AND PHARMACOLOGY  
COLUMBUS, OHIO 43210

R. C. GARG  
ADJUNCT ASSISTANT PROFESSOR AND SENIOR  
RESEARCH ASSOCIATE  
(614) 422-0492

TESTS PERFORMED:

GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE  
( $^{125}\text{I}$ -IOTHALAMATE DISAPPEARANCE)  
RENAL HEMODYNAMICS: RENAL BLOOD FLOW ( $^{131}\text{I}$  SODIUM  
IODOHIPPURATE CLEARANCE)

TEST SYSTEMS UTILIZED:

DOGS, CATS, COWS

COMPOUNDS TESTED:

MOSTLY UNTREATED ANIMALS ARE USED

TERMINAL:

ONLY SERIAL

REMARKS:

IN ADDITION TO R. C. GARG, T. E. POWERS AND J. D. POWERS ARE  
ACTIVELY INVOLVED IN RENAL TESTING PROGRAMS AT THIS INSTITUTION.

ORGANIZATION:

SCHERING-PLough CORPORATION  
P.O. BOX 32  
LAFAYETTE, NEW JERSEY 07848

L. E. ARTHAUD  
PRINCIPAL TOXICOLOGIST  
(201) 383-3211

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR DYSFUNCTION (BUN AND URINARY  
PROTEIN MEASUREMENT)  
TUBULAR FUNCTION: URINARY CONCENTRATING ABILITY (OSMOLALITY)

TEST SYSTEMS UTILIZED:

RATS, DOGS

COMPOUNDS TESTED:

BROMOETHYLAMINE, METHOXYFLURANE

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

SMITH KLINE AND FRENCH LABORATORIES  
PHILADELPHIA, PENNSYLVANIA 19101

F. T. BRENNAN  
SENIOR PHARMACOLOGIST  
(215) 854-4000 Ext. 5510

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (INULIN AND  
CREATININE CLEARANCE)  
TUBULAR FUNCTION: SECRETIVE TEST (URINARY EXCRETION OF  
ELECTROLYTES)  
RENAL HEMODYNAMICS: RENAL PLASMA FLOW (PAH CLEARANCE)

TEST SYSTEMS UTILIZED:

RATS, DOGS, MONKEYS

COMPOUNDS TESTED:

TRIAMTERENE, HYDROCHLOROTHIAZIDE, FUROSEMIDE, ACETAZOLEAMIDE,  
DOPAMINE, BULBOCAPNINE, VARIOUS DRUGS

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

BESIDES F. T. BRENNAN, V. D. WIEBELHAUS IS INVOLVED IN RENAL  
TESTING PROGRAMS AT THIS INSTITUTION

ORGANIZATION:

SOUTHERN CALIFORNIA EDISON POWER COMPANY  
RESEARCH AND DEVELOPMENT DEPARTMENT  
ROSEMEAD, CALIFORNIA

E. J. FAEDER  
SENIOR RESEARCH SCIENTIST  
(213) 572-2009

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR DYSFUNCTION (URINARY PROTEIN  
MEASUREMENT)  
BIOCHEMICAL DAMAGE INDICATORS

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

CADMIUM, ZINC

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

THE SQUIBB INSTITUTE FOR MEDICAL RESEARCH  
DEPARTMENT OF DRUG METABOLISM  
NEW BRUNSWICK, NEW JERSEY 08903

S. M. SINGHVI  
RESEARCH GROUP LEADER  
(201) 545-1300

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY  
GLOMERULAR FUNCTION:  
    GLOMERULAR FILTRATION RATE (CREATININE AND UREA CLEARANCE)  
    GLOMERULAR DYSFUNCTION (BUN MEASUREMENT)  
TUBULAR FUNCTION: SECRETIVE TEST (PAH TRANSPORT MAXIMUM  
    MEASUREMENT)  
RENAL HEMODYNAMICS: RENAL BLOOD FLOW (PAH CLEARANCE)  
BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

RATS, DOGS, MONKEYS

COMPOUNDS TESTED:

URANYL NITRATE, MERCURIC CHLORIDE, CARBON TETRACHLORIDE

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO S. M. SINGHVI, L. T. DIFAZIO AND J. W. POUTSIAKA  
ARE INVOLVED IN RENAL TESTING PROGRAMS AT THIS INSTITUTION

ORGANIZATION:

STANFORD UNIVERSITY  
SCHOOL OF MEDICINE  
DEPARTMENT OF CLINICAL PATHOLOGY  
STANFORD, CALIFORNIA 94305

J. C. KOSEK  
PROFESSOR OF CLINICAL PATHOLOGY  
(415) 493-5000 EXT. 5753

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
TUBULAR FUNCTION: SECRETIVE TEST (URINARY EXCRETION OF  
ELECTROLYTES)  
BIOCHEMICAL DAMAGE INDICATORS

TEST SYSTEMS UTILIZED:

MICE, RATS, RABBITS, GUINEA PIGS

COMPOUNDS TESTED:

GENTAMICIN AND OTHER AMINOGLYCOSIDES

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO J. C. KOSEK, M. J. COUSINS IS INVOLVED IN RENAL  
TESTING PROGRAMS AT THIS INSTITUTION

ORGANIZATION:

STANFORD UNIVERSITY  
SCHOOL OF MEDICINE  
DEPARTMENT OF ANESTHESIOLOGY  
STANFORD, CALIFORNIA 94305

R. I. MAZZE  
ASSISTANT CHAIRMAN  
(415) 497-6411

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION:

GLOMERULAR FILTRATION RATE (CREATININE AND UREA CLEARANCE)

GLOMERULAR DYSFUNCTION (BUN AND URINARY PROTEIN MEASUREMENT)

TUBULAR FUNCTION:

URINARY CONCENTRATING ABILITY (OSMOLALITY)

SECRETIVE TEST (URINARY EXCRETION OF ELECTROLYTES)

BIOCHEMICAL DAMAGE INDICATORS

TEST SYSTEMS UTILIZED:

MICE, RATS

COMPOUNDS TESTED:

METHOXYFLURANE, FLUORIDE

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

STATE UNIVERSITY OF NEW YORK, STONY BROOK  
DEPARTMENT OF NEPHROLOGY  
STONY BROOK, LONG ISLAND  
NEW YORK 11794

G. J. KALOYANIDES  
CHAIRMAN  
(516) 246-2038

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION:

GLOMERULAR DYSFUNCTION (URINARY PROTEIN MEASUREMENT)  
GLOMERULAR FILTRATION RATE (INULIN AND CREATININE CLEAR-  
ANCE)

TUBULAR FUNCTION:

SECRETIVE TEST  
IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE  
TECHNIQUE)

BIOCHEMICAL DAMAGE INDICATORS

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

VARIOUS ANTIBIOTICS

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

UNIVERSITY OF ARKANSAS  
SCHOOL FOR MEDICAL SCIENCES  
DEPARTMENT OF PATHOLOGY  
4306 WEST MARKHAM STREET  
LITTLE ROCK, ARKANSAS 72201

L. W. CHANG  
ASSOCIATE PROFESSOR  
(501) 661-5171

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR DYSFUNCTION (URINARY PROTEIN  
MEASUREMENT)  
TUBULAR FUNCTION: SECRETIVE TEST (URINARY EXCRETION OF  
ELECTROLYTES)  
BIOCHEMICAL DAMAGE INDICATOR: URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

MICE, RATS, GOLDEN HAMSTERS

COMPOUNDS TESTED:

MOSTLY HEAVY METALS - LEAD, CADMIUM, MERCURIC, BICHLORIDE,  
METHYLMERCURIC CHLORIDE

TERMINAL:

BOTH SERIAL AND TERMINAL; HOWEVER, MOSTLY ANIMALS ARE  
TERMINATED FOR MICROSCOPIC STUDIES.

ORGANIZATION:

UNIVERSITY OF CINCINNATI MEDICAL CENTER  
DEPARTMENT OF ENVIRONMENTAL HEALTH  
3223 EDEN AVENUE  
CINCINNATI, OHIO 45267

D. R. JOHNSON  
ASSOCIATE PROFESSOR AND HEAD OF GRADUATE STUDIES  
(513) 872-5759

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: GROSS APPEARANCE AND LIGHT MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (CREATININE AND INULIN CLEARANCE)  
TUBULAR FUNCTION:  
    SECRETIVE TESTS (URINARY EXCRETION OF ELECTROLYTES)  
    IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE TECHNIQUE)  
RENAL HEMODYNAMICS: RENAL PLASMA FLOW (PAH CLEARANCE)

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

HEAVY METALS - LEAD, MERCURY, ETC.

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO D. R. JOHNSON, L. I. KLEINMAN IS ENGAGED IN THE RENAL TESTING PROGRAM AT THIS INSTITUTION

ORGANIZATION:

UNIVERSITY OF HOUSTON  
COLLEGE OF PHARMACY  
DIVISION OF CARDIOVASCULAR RESEARCH  
HOUSTON, TEXAS

J. P. BUCKLEY  
DEAN  
(713) 749-4106

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
TUBULAR FUNCTION: SECRETIVE TEST (URINARY EXCRETION OF  
ELECTROLYTES)

TEST SYSTEMS UTILIZED:

DOGS, CATS

COMPOUNDS TESTED:

ANGIOTENSIN II

TERMINAL:

BOTH SERIAL AND TERMINAL, BUT MOST OF THE ANIMALS ARE TERMINATED  
FOR MICROSCOPIC EXAMINATION

REMARKS:

IN ADDITION TO J. P. BUCKLEY, M. L. STEENBERG AND B. S.  
JANDHYALA ARE ACTIVELY INVOLVED IN RENAL TESTING PROGRAMS AT  
THIS INSTITUTION

ORGANIZATION:

UNIVERSITY OF IOWA  
COLLEGE OF MEDICINE  
DIVISION OF NEPHROLOGY, HYPERTENSION AND ELECTROLYTES  
IOWA CITY, IOWA 52242

L. COHEN  
ASSISTANT PROFESSOR  
(319) 353-3126

TESTS PERFORMED:

GLOMERULAR FUNCTION:

GLOMERULAR DYSFUNCTION (BUN MEASUREMENT)  
GLOMERULAR FILTRATION RATE (INULIN AND CREATININE CLEARANCE)

TUBULAR FUNCTION:

SECRETIVE TESTS (URINARY EXCRETION OF ELECTROLYTES)  
IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE  
TECHNIQUE AND ISOLATED PERFUSED TUBULES)

URINARY CONCENTRATING ABILITY (OSMOLALITY)

RENAL HEMODYNAMICS: RENAL BLOOD FLOW MEASUREMENT (PAH  
CLEARANCE)

TEST SYSTEMS UTILIZED:

RATS, DOGS, RABBITS

COMPOUNDS TESTED:

GENTAMICIN AND OTHER AMINOGLYCOSIDES

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

UNIVERSITY OF MISSISSIPPI MEDICAL CENTER  
DEPARTMENT OF PHARMACOLOGY AND TOXICOLOGY  
JACKSON, MISSISSIPPI 39216

W. O. BERNDT  
CHAIRMAN  
(601) 987-4729

TESTS PERFORMED:

GLOMERULAR FUNCTION: GLOMERULAR DYSFUNCTION (URINARY PROTEIN)  
TUBULAR FUNCTION:

REABSORPTIVE TEST (GLUCOSE MEASUREMENT IN URINE)  
SECRETIVE TEST  
IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE  
TECHNIQUE)  
URINARY CONCENTRATING ABILITY (OSMOLALITY)

TEST SYSTEMS UTILIZED:

MICE, RATS, RABBITS, DOGS

COMPOUNDS TESTED:

HEAVY METALS, HALOGENATED HYDROCARBONS, CITRININ, RADIOPAQUE  
SUBSTANCES

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

UNIVERSITY OF MONTREAL  
DEPARTMENT OF PHARMACOLOGY  
MONTREAL, QUEBEC H3C3J7, CANADA

G. L. PLAA  
CHAIRMAN  
(514) 343-6334

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR DYSFUNCTION (URINARY PROTEIN  
AND PSP MEASUREMENT)

TUBULAR FUNCTION:

REABSORPTIVE TEST (GLUCOSE MEASUREMENT IN URINE)

SECRETIVE TEST

IN VITRO EVALUATION OF RENAL TRANSPORT (CORTICAL SLICE  
TECHNIQUES)

TEST SYSTEMS UTILIZED:

MICE, RATS, RABBITS

COMPOUNDS TESTED:

MIREX, CHLOROFORM, MERCURY, CHROMATE, ANTIBIOTICS

TERMINAL:

BOTH SERIAL AND TERMINAL; HOWEVER, MOSTLY EXPERIMENTAL ANIMALS  
ARE TERMINATED FOR EITHER MICROSCOPIC STUDIES OR IN VITRO RENAL  
CORTICAL SLICE TECHNIQUE STUDIES

ORGANIZATION:

UNIVERSITY OF NORTH CAROLINA  
SCHOOL OF MEDICINE  
DIVISION OF NEPHROLOGY  
CHAPEL HILL, NORTH CAROLINA 27514

W. F. FINN  
ASSOCIATE PROFESSOR  
(919) 966-2561

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (INULIN  
CLEARANCE)  
TUBULAR FUNCTION: URINARY CONCENTRATING ABILITY (OSMOLALITY)  
RENAL HEMODYNAMICS:  
    RENAL BLOOD FLOW (PAH CLEARANCE)  
    INTRARENAL DISTRIBUTION OF RENAL BLOOD FLOW ( $^{85}\text{Kr}$  and  
 $^{133}\text{Xe}$  - WASHOUT MEASUREMENT)

TEST SYSTEMS UTILIZED:

ANESTHETIZED RATS

COMPOUNDS TESTED:

MERCURIC CHLORIDE, BARIUM SULFATE AND VASCULAR SHOCK PRODUCED BY  
CLAMPING OF THE RENAL ARTERY

TERMINAL:

BOTH SERIAL AND TERMINAL; HOWEVER, MOST OF THE EXPERIMENTAL  
ANIMALS ARE TERMINATED FOR MICROSCOPIC EXAMINATION

ORGANIZATION:

UNIVERSITY OF NORTH CAROLINA  
SCHOOL OF MEDICINE  
DIVISION OF NEPHROLOGY  
CHAPEL HILL, NORTH CAROLINA 27514

C. W. GOTTSCHALK  
PROFESSOR OF MEDICINE  
(919) 966-4567

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT MICROSCOPY  
TUBULAR FUNCTIONS:  
SECRETIVE TEST (URINARY EXCRETION OF ELECTROLYTES)  
URINARY CONCENTRATING ABILITY (OSMOLALITY)

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

MERCURY, POTASSIUM DICHROMATE

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO C. W. GOTTSCHALK, W. E. LASSITER AND W. FINN ARE INVOLVED IN RENAL TESTING PROGRAMS AT THIS INSTITUTION

ORGANIZATION:

UNIVERSITY OF OTTAWA  
SCHOOL OF MEDICINE  
DEPARTMENT OF PHARMACOLOGY  
OTTAWA, ONTARIO, K1N6N5 CANADA

R. L. SINGHAL  
PROFESSOR AND HEAD  
(613) 231-3238

TESTS PERFORMED:

GLOMERULAR FUNCTION:

GLOMERULAR DYSFUNCTION (URINARY PROTEIN AND BUN MEASUREMENT)  
GLOMERULAR FILTRATION RATE (CREATININE AND UREA CLEARANCE)  
BIOCHEMICAL DAMAGE INDICATOR: RENAL TISSUE HOMOGENATE PREPARATIONS

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

VARIOUS INSECTICIDES  
HEAVY METALS - MERCURY, LEAD, CADMIUM, ETC.

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

UNIVERSITY OF PENNSYLVANIA  
SCHOOL OF MEDICINE  
THE RENAL-ELECTROLYTE SECTION  
PHILADELPHIA, PENNSYLVANIA 19104

Z. S. AGUS  
CHIEF, THE RENAL-ELECTROLYTE SECTION  
(215) 662-3603

TESTS PERFORMED:

GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (CREATININE  
AND INULIN CLEARANCE)

TUBULAR FUNCTION:

REABSORPTIVE TEST (GLUCOSE MEASUREMENT IN URINE)

SECRETIVE TEST (URINARY EXCRETION OF ELECTROLYTES)

RENAL HEMODYNAMICS: RENAL BLOOD FLOW (PAH CLEARANCE)

TEST SYSTEMS UTILIZED

MICE, RATS, RABBITS, CATS, DOGS

COMPOUNDS TESTED:

NONE, ONLY NORMAL ANIMALS ARE USED

TERMINAL:

SERIAL ONLY

REMARKS:

IN ADDITION TO Z. S. AGUS, STANLEY GOLDFORB IS ACTIVELY INVOLVED  
IN RENAL TESTING PROGRAMS AT THIS INSTITUTION

ORGANIZATION:

UNIVERSITY OF ROCHESTER  
SCHOOL OF MEDICINE  
DEPARTMENT OF RADIATION BIOLOGY AND BIOPHYSICS  
ROCHESTER, NEW YORK 14642

T. W. CLARKSON  
PROFESSOR  
(716) 275-3911

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY

TUBULAR FUNCTION:

SECRETIVE TEST

IN VITRO EVALUATION OF RENAL TRANSPORT (ISOLATED PERFUSED  
TUBULES)

BIOCHEMICAL DAMAGE INDICATOR: RENAL TISSUE HOMOGENATE  
PREPARATIONS

TEST SYSTEMS UTILIZED:

MICE, RATS, DOGS

COMPOUNDS TESTED:

ELEMENTAL MERCURY VAPOR, METHYL MERCURY, CADMIUM, LEAD AND OTHER  
HEAVY METALS

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

UNIVERSITY OF ROCHESTER  
SCHOOL OF MEDICINE AND DENTISTRY  
DIVISION OF TOXICOLOGY  
ROCHESTER, NEW YORK 14642

Z.A. SHAIKH  
ASSISTANT PROFESSOR  
(716) 275-5383

TESTS PERFORMED:

TUBULAR FUNCTION: PROTEIN AND GLUCOSE MEASUREMENTS IN URINE  
HISTOLOGY: KIDNEY, LIVER  
BIOLOGICAL INDICATOR OF TOXICITY: METALLOTHIONEIN MEASUREMENTS  
IN PLASMA AND URINE

TEST SYSTEMS USED:

MICE, RATS, RABBITS  
ALSO ASSAY OF METALLOTHIONEIN IN PLASMA AND URINE FROM HUMANS

SUBSTANCES USED:

CADMIUM, MERCURY AND OTHER HEAVY METALS

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

UNIVERSITY OF TENNESSEE CENTER FOR THE HEALTH SCIENCES  
DIVISION OF NEPHROLOGY  
MEMPHIS, TENNESSEE 38163

F. E. HATCH  
PROFESSOR OF MEDICINE  
(901) 528-5765

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION:

GLOMERULAR DYSFUNCTION (BUN MEASUREMENT)

GLOMERULAR FILTRATION RATE (CREATININE, INULIN AND UREA  
CLEARANCE)

TUBULAR FUNCTION: URINARY CONCENTRATING ABILITY (OSMOLALITY AND  
SPECIFIC GRAVITY)

TEST SYSTEMS UTILIZED:

MICE, RATS, RABBITS, DOGS

COMPOUNDS TESTED:

NO SUBSTANCE OR DRUG IS TESTED, BUT NORMAL ANIMALS ARE USED

TERMINAL:

BOTH SERIAL AND TERMINAL

REMARKS:

IN ADDITION TO F. E. HATCH, L. R. CROWE IS INVOLVED IN RENAL  
TESTING PROGRAMS AT THIS INSTITUTION

ORGANIZATION:

UNIVERSITY OF WASHINGTON  
SCHOOL OF MEDICINE  
DEPARTMENT OF PHARMACOLOGY  
SEATTLE, WASHINGTON 98195

T. A. LOOMIS  
PROFESSOR  
(206) 543-0169

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENT: LIGHT MICROSCOPY  
TUBULAR FUNCTION: URINARY CONCENTRATING ABILITY (OSMOLALITY)  
BIOCHEMICAL DAMAGE INDICATORS

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

FLUORIDE, METHOXYFLURANE

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

UNIVERSITY OF WESTERN ONTARIO  
DEPARTMENT OF PATHOLOGY  
LONDON, ONTARIO, CANADA

G. M. CHERIAN  
ASSISTANT PROFESSOR  
(519) 679-6743

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: LIGHT AND ELECTRON MICROSCOPY  
GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (INULIN  
CLEARANCE)  
RENAL HEMODYNAMICS: RENAL BLOOD FLOW (PAH CLEARANCE)  
BIOCHEMICAL DAMAGE INDICATOR: RENAL TISSUE HOMOGENATE  
PREPARATIONS

TEST SYSTEMS UTILIZED:

MICE, RATS, RABBITS

COMPOUNDS TESTED:

MERCURY, CADMIUM AND OTHER HEAVY METALS

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

U. S. ENVIRONMENTAL PROTECTION AGENCY  
GENETICS TOXICOLOGY DIVISION  
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711

L. C. KING  
RESEARCH BIOLOGIST  
(919) 541-3932

TESTS PERFORMED:

MORPHOLOGICAL MEASUREMENTS: SCANNING ELECTRON MICROSCOPIC  
STRUCTURAL STUDIES  
BIOCHEMICAL DAMAGE INDICATORS:  
RENAL METABOLIC STUDIES  
URINARY ENZYME ACTIVITY

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

CADMIUM

TERMINAL:

BOTH SERIAL AND TERMINAL

ORGANIZATION:

VANDERBILT UNIVERSITY  
SCHOOL OF MEDICINE  
DEPARTMENT OF PHARMACOLOGY  
NASHVILLE, TENNESSEE 37232

B.V. RAMA SASTRY  
PROFESSOR  
(615) 322-2207

TESTS PERFORMED:

GLOMERULAR FUNCTION: GLOMERULAR FILTRATION RATE (INULIN CLEARANCE)

TUBULAR FUNCTION: SECRETIVE TEST (URINARY EXCRETION OF ELECTROLYTES)

RENAL HEMODYNAMICS: RENAL BLOOD FLOW (PAH CLEARANCE)

BIOCHEMICAL DAMAGE INDICATOR: PLASMA RENIN MEASUREMENT

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

TRIAMTERENE

TERMINAL:

ONLY SERIAL

**APPENDIX A**  
**TESTS PERFORMED BY EACH ORGANIZATION**

#### MORPHOLOGICAL MEASUREMENTS

##### GENERAL MORPHOLOGY, HISTOPATHOLOGY

Baylor College of Medicine  
Dartmouth Medical College  
Department of Health and Welfare, Ottawa, Canada  
Environmental Protection Agency  
Georgetown University  
Harvard Medical School  
Indiana University  
Medical College of Virginia  
Mount Desert Island Biological Laboratories  
National Institute of Environmental Health Sciences  
Schering-Plough Corporation  
Smith Kline and French Laboratories  
Southern California Edison Power Company  
The Squibb Institute for Medical Research  
Stanford University  
State University of New York, Stony Brook  
University of Arkansas  
University of Cincinnati Medical Center  
University of Houston  
University of Montreal  
University of North Carolina  
University of Ottawa  
University of Rochester  
University of Tennessee Center for the Health Sciences  
University of Washington  
University of Western Ontario

#### GLOMERULAR FUNCTION

Dartmouth Medical School  
Department of Health and Welfare, Ottawa, Canada  
Duke University Medical Center  
Georgetown University  
Harvard Medical School  
ICI Americas, Inc.  
Indiana University  
Medical College of Virginia  
Michigan State University  
National Institute of Health  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Ohio State University  
Schering-Plough Corporation

GLOMERULAR FUNCTION (continued)

Smith Kline and French Laboratories  
Southern California Edison Power Company  
The Squibb Institute for Medical Research  
Stanford University  
State University of New York, Stoney Brook  
University of Arkansas  
University of Cincinnati Medical Center  
University of Iowa  
University of Mississippi Medical Center  
University of Montreal  
University of North Carolina  
University of Ottawa  
University of Rochester  
University of Tennessee Center for the Health Sciences  
University of Western Ontario  
Vanderbilt University

Glomerular Dysfunction: BUN, Creatinine or Urinary Protein Measurement

Dartmouth Medical School  
Department of Health and Welfare, Ottawa, Canada  
Georgetown University  
Harvard Medical School  
Indiana University  
Medical College of Virginia  
Michigan State University  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Schering-Plough Corporation  
Southern California Edison Power Company  
The Squibb Institute for Medical Research  
Stanford University  
State University of New York  
University of Arkansas  
University of Mississippi Medical Center  
University of Montreal  
University of Ottawa  
University of Rochester

Measurement of Glomerular Filtration Rate

Clearance of Inulin, Creatinine, Iothalamate, Diatrizoate, Urea, etc.  
(Vitamin B<sub>12</sub>, <sup>3</sup>H Mannitol, <sup>51</sup>Ca Eddetic Acid, <sup>14</sup>C Nadolol)

Dartmouth Medical School  
Duke University Medical Center  
Georgetown University  
Harvard Medical School  
ICI Americas, Inc.  
Indiana University

GLOMERULAR FUNCTION (concluded)

Medical College of Virginia  
Michigan State University  
National Institutes of Health  
National Institute of Environmental Health Sciences  
Smith Kline and French Laboratories  
Stanford University  
State University of New York, Stony Brook  
University of Cincinnati Medical Center  
University of Iowa  
University of North Carolina  
University of Ottawa  
University of Pennsylvania  
University of Tennessee, Center for the Health Sciences  
University of Western Ontario  
Vanderbilt University

Disappearance of Iothalamate and Diatrizoate

Dartmouth Medical School  
Ohio State University

### TUBULAR FUNCTION

Baylor College of Medicine  
Dartmouth Medical School  
Department of Health and Welfare, Ottawa, Canada  
Department of Health and Welfare, Vancouver, Canada  
Food and Drug Research Laboratories  
Georgetown University  
Harvard Medical School  
ICI Americas, Inc.  
Medical College of Virginia  
Michigan State University  
Mount Desert Island Biological Laboratories  
National Institutes of Health  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Schering-Plough Corporation  
Smith, Kline and French Laboratories  
Stanford University  
State University of New York, Stony Brook  
University of Arkansas  
University of Cincinnati Medical Center  
University of Houston  
University of Iowa  
University of Mississippi Medical Center  
University of Montreal  
University of North Carolina  
University of Pennsylvania  
University of Rochester  
University of Tennessee Center for the Health Sciences

### Reabsorptive Tests

#### Measurement of Glucose in Urine

Stanford University  
University of Mississippi Medical Center  
University of Montreal  
University of North Carolina  
University of Pennsylvania

### Secretive Tests

#### Urinary Acidification Measurement

University of North Carolina

#### PAH Transport Maximum Measurement

Dartmouth Medical School  
The Squibb Institute for Medical Research

TUBULAR FUNCTION (continued)

In Vitro Evaluation of Renal Transport of PAH, NMN, and TEA

Cortical Slice Technique

Baylor College of Medicine  
Food and Drug Research Laboratories  
Georgetown University  
Michigan State University  
National Institute of Environmental Health Sciences  
Stanford University  
State University of New York, Stony Brook  
University of Cincinnati Medical Center  
University of Iowa  
University of Mississippi Medical Center  
University of Montreal

Isolated Perfused Tubules

Food and Drug Research Laboratories  
ICI, Americas, Inc.  
National Institutes of Health  
University of Iowa  
University of Rochester

Urinary Concentrating and Diluting Ability

Urine Specific Gravity Measurement

Georgetown University  
Harvard Medical School  
North Carolina Central University  
University of Arkansas  
University of Tennessee Center for the Health Sciences

Urine Osmolality Measurement

Dartmouth Medical School  
Duke University Medical Center  
Food and Drug Research Laboratories  
Georgetown University  
Harvard Medical School  
ICI, Americas, Inc.  
Michigan State University  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Schering-Plough Corporation  
Stanford University  
State University of New York, Stony Brook

TUBULAR FUNCTION (concluded)

University of Arkansas  
University of Cincinnati Medical Center  
University of Iowa  
University of Mississippi Medical Center  
University of North Carolina  
University of Tennessee Center for the Health Sciences  
University of Washington

General Tubular Damage (Examination of Urinary Sediments)

Department of Health and Welfare, Ottawa, Canada

MEASUREMENT OF RENAL HEMODYNAMICS

Baylor College of Medicine  
Dartmouth Medical School  
Duke University Medical Center  
Food and Drug Research Laboratories  
Georgetown University  
ICI, Americas, Inc.  
Ohio State University  
Smith Kline and French Laboratories  
University of Cincinnati Medical Center  
University of Iowa  
University of North Carolina  
University of Pennsylvania  
University of Tennessee Center for the Health Sciences  
University of Western Ontario  
Vanderbilt University

Renal Blood Flow Measurement

Plasma Clearance of PAH, Iodohippurate and Iodopyracet  
Dartmouth Medical School  
Duke University Medical University  
Food and Drug Research Laboratories  
Georgetown University  
ICI Americas, Inc.  
Smith Kline and French Laboratories  
The Squibb Institute for Medical Research  
University of Cincinnati Medical Center  
University of Iowa  
University of North Carolina  
University of Pennsylvania  
University of Tennessee Center for the Health Sciences  
University of Western Ontario  
Vanderbilt University

Plasma Disappearance of  $^{125}\text{I}$  or  $^{131}\text{I}$  Orthiodohippurate  
Dartmouth Medical School  
Food and Drug Research Laboratories  
Ohio State University

Measurement of Regional Blood Flow and Intrarenal Distribution of Blood Flow

$^{85}\text{Kr}$ - and  $^{133}\text{Xe}$ - Washout Measurement  
University of North Carolina

BIOCHEMICAL DAMAGE INDICATORS

Baylor College of Medicine  
Dartmouth Medical School  
Duke University Medical Center  
Environmental Protection Agency  
Food and Drug Research Laboratories  
Georgetown University  
ICI Americas, Inc.  
Indiana University  
Medical College of Virginia  
Michigan State University  
National Institutes of Health  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Schering-Plough Corporation  
Southern California Edison Power Company  
Stanford University  
State University of New York, Stony Brook  
The Squibb Institute for Medical Research  
University of Arkansas  
University of Ottawa  
University of Rochester  
University of Washington  
University of Western Ontario  
Vanderbilt University

Drug Metabolic Studies

Baylor College of Medicine  
Dartmouth Medical School

Plasma Renin Measurement

Duke University Medical Center  
Vanderbilt University

Renal Tissue Homogenate Preparations

Baylor College of Medicine  
Dartmouth Medical School  
University of Ottawa  
University of Rochester  
University of Western Ontario

Urinary Enzyme Activity

Baylor College of Medicine  
Environmental Protection Agency  
Food and Drug Research Laboratories  
Georgetown University

BIOCHEMICAL DAMAGE INDICATORS (concluded)

Urinary Enzyme Activity (concluded)

Indiana University  
Medical College of Virginia  
Michigan State University  
National Institutes of Health  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Schering-Plough Corporation  
Southern California Edison Power Company  
The Squibb Institute for Medical Research

**APPENDIX B**  
**TEST SYSTEMS UTILIZED BY EACH ORGANIZATION**

CATS

Ohio State University  
University of Houston  
University of Pennsylvania

Glomerular Filtration Rate  
Ohio State University  
University of Pennsylvania

Morphology, Histopathology  
University of Houston

Reabsorptive Tests  
University of Pennsylvania

Renal Blood Flow  
Ohio State University  
University of Pennsylvania

Selective Tests  
University of Houston  
University of Pennsylvania

COWS

Ohio State University

Glomerular Filtration Rate  
Ohio State University

Renal Blood Flow  
Ohio State University

DOGS

Dartmouth Medical School  
Department of Health and Welfare, Vancouver, Canada  
Georgetown University  
ICI Americas, Inc.  
Ohio State University  
Schering-Plough Corporation  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research  
University of Houston  
University of Iowa  
University of Mississippi Medical Center  
University of Pennsylvania  
University of Rochester  
University of Tennessee Center for the Health Sciences

DOGS (continued)

Biochemical Damage Indicators

ICI Americas, Inc.  
University of Rochester

Drug Metabolic Studies  
Dartmouth Medical School

Glomerular Dysfunction  
Dartmouth Medical School  
Georgetown University  
Schering-Plough Corporation  
The Squibb Institute for Medical Research  
University of Iowa  
University of Mississippi Medical Center  
University of Rochester  
University of Tennessee Center for the Health Sciences

Glomerular Filtration Rate  
Dartmouth Medical School  
Department of Health and Welfare, Vancouver, Canada  
Georgetown University  
ICI Americas, Inc.  
Ohio State University  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research  
University of Iowa  
University of Pennsylvania  
University of Tennessee Center for the Health Sciences

Morphology, Histopathology  
Dartmouth Medical School  
Georgetown University  
Schering-Plough Corporation  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research  
University of Houston  
University of Rochester  
University of Tennessee Center for the Health Sciences

Reabsorptive Tests  
University of Mississippi Medical Center  
University of Pennsylvania  
University of Rochester

Renal Blood Flow  
Dartmouth Medical School  
Georgetown University  
ICI Americas, Inc.  
Ohio State University  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research  
University of Iowa  
University of Pennsylvania

DOGS (concluded)

Renal Tissue Homogenate Preparations

Dartmouth Medical School  
University of Rochester

Secretive Tests

Dartmouth Medical School  
Department of Health and Welfare, Vancouver, Canada  
Georgetown University  
ICI Americas, Inc.  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research  
University of Houston  
University of Iowa  
University of Mississippi Medical Center  
University of Pennsylvania  
University of Rochester

Urinary Concentrating and Diluting Ability

Dartmouth Medical School  
Georgetown University  
ICI Americas, Inc.  
Schering-Plough Corporation  
University of Iowa  
University of Mississippi Medical Center  
University of Tennessee Center for the Health Sciences

Urinary Enzyme Activity

Georgetown University  
The Squibb Institute for Medical Research

GUINEA PIGS

Dartmouth Medical School  
Department of Health and Welfare, Vancouver, Canada  
Georgetown University  
Harvard Medical School  
Stanford University

Biochemical Damage Indicators  
Stanford University

Drug Metabolic Studies  
Dartmouth Medical School

Glomerular Dysfunction  
ICI Americas, Inc.  
Harvard Medical School

GUINEA PIGS (concluded)

Glomerular Filtration Rate

Dartmouth Medical School  
Department of Health and Welfare, Vancouver, Canada  
Georgetown University  
Harvard Medical School

Morphology, Histopathology

Dartmouth Medical School  
Georgetown University  
Harvard Medical School  
Stanford University

Renal Blood Flow

Dartmouth Medical School  
Georgetown University

Renal Tissue Homogenate Preparations

Dartmouth Medical School

Secretive Tests

Dartmouth Medical School  
Department of Health and Welfare, Vancouver, Canada  
Georgetown University  
Stanford University

Urinary Concentrating and Diluting Ability

Dartmouth Medical School  
Georgetown University  
Harvard Medical School

Urinary Enzyme Activity

Georgetown University

HAMSTERS

Baylor College of Medicine  
Dartmouth Medical School  
Mount Desert Island Biological Laboratories  
University of Arkansas  
Univeristy of North Carolina

Drug Metabolic Studies

Baylor College of Medicine  
Dartmouth Medical School

Glomerular Dysfunction

Univeristy of Arkansas

HAMSTERS (concluded)

Glomerular Filtration Rate  
Dartmouth Medical School

Morphology, Histopathology  
Baylor College of Medicine  
Dartmouth Medical School  
Mount Desert Island Biological Laboratories  
University of Arkansas  
University of North Carolina

Renal Blood Flow  
Baylor College of Medicine  
Dartmouth Medical School

Renal Tissue Homogenate Preparations  
Baylor College of Medicine  
Dartmouth Medical School

Secretive Tests  
Baylor College of Medicine  
Dartmouth Medical School  
University of Arkansas

Urinary Concentrating and Diluting Ability  
Dartmouth Medical School

Urinary Enzyme Activity  
Baylor College of Medicine  
University of Arkansas

HUMANS

Duke University Medical Center  
Georgetown University

Glomerular Dysfunction  
Duke University Medical Center  
Georgetown University

Glomerular Filtration Rate  
Duke University Medical Center  
Georgetown University

Morphology, Histology  
Georgetown University

Plasma Renin Measurement  
Duke University Medical Center

Renal Blood Flow  
Georgetown University

Secretive Tests  
Duke University Medical Center  
Georgetown University

Urinary Concentrating and Diluting Ability  
Duke University Medical Center  
Georgetown University

Urinary Enzyme Activity  
Georgetown University

MICE

Baylor College of Medicine  
Dartmouth Medical School  
Georgetown University  
ICI Americas, Inc.  
Michigan State University  
National Institute of Environmental Health Sciences  
Stanford University  
University of Arkansas  
University of Mississippi Medical Center  
University of Montreal  
University of Pennsylvania  
University of Rochester  
University of Tennessee Center for the Health Sciences  
University of Western Ontario

MICE (continued)

Biochemical Damage Indicators

ICI Americas, Inc.  
National Institute of Environmental Health Sciences  
Stanford University  
University of Rochester

Drug Metabolic Studies

Baylor College of Medicine  
Dartmouth Medical School

Glomerular Dysfunction

Georgetown University  
Michigan State University  
National Institute of Environmental Health Sciences  
Stanford University  
University of Arkansas  
University of Mississippi Medical Center  
University of Montreal  
University of Rochester  
University of Tennessee Center for the Health Sciences

Glomerular Filtration Rate

Dartmouth Medical School  
Georgetown University  
ICI Americas, Inc.  
Michigan State University  
National Institute of Environmental Health Sciences  
Stanford University  
University of Pennsylvania  
University of Tennessee Center for the Health Sciences  
University of Western Ontario

Morphology, Histology

Baylor College of Medicine  
Georgetown University  
National Institute of Environmental Health Sciences  
Stanford University  
University of Arkansas  
University of Mississippi Medical Center  
University of Montreal  
University of Rochester  
University of Tennessee Center for the Health Sciences  
University of Western Ontario

Reabsorptive Tests

University of Mississippi Medical Center  
University of Montreal  
University of Pennsylvania  
University of Rochester

MICE (concluded)

Renal Blood Flow

Baylor College of Medicine  
Dartmouth Medical School  
Georgetown University  
ICI Americas, Inc.  
University of Pennsylvania  
University of Western Ontario

Renal Tissue Homogenate Preparations

Baylor College of Medicine  
Dartmouth Medical School  
University of Rochester  
University of Western Ontario

Secretive Tests

Baylor College of Medicine  
Dartmouth Medical School  
Georgetown University  
ICI Americas, Inc.  
Michigan State University  
National Institute of Environmental Health Sciences  
Stanford University  
University of Arkansas  
University of Mississippi Medical Center  
University of Montreal  
University of Pennsylvania  
University of Rochester

Urinary Concentrating and Diluting Ability

Dartmouth Medical School  
Georgetown University  
ICI Americas, Inc.  
Michigan State University  
National Institute of Environmental Health Sciences  
Stanford University  
University of Mississippi Medical Center  
University of Tennessee Center for the Health Sciences

Urinary Enzyme Activity

Baylor College of Medicine  
Georgetown University  
National Institute of Environmental Health Sciences  
University of Arkansas

**MONKEYS**

Georgetown University  
Harvard Medical School  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research

Glomerular Dysfunction  
Georgetown University  
Harvard Medical School  
The Squibb Institute for Medical Research

Glomerular Filtration Rate  
Georgetown University  
Harvard Medical School  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research

Morphology, Histology  
Georgetown University  
Harvard Medical School  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research

Renal Blood Flow  
Georgetown University  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research

Secretive Tests  
Georgetown University  
Smith, Kline and French Laboratories  
The Squibb Institute for Medical Research

Urinary Concentrating and Diluting Ability  
Georgetown University  
Harvard Medical School

Urinary Enzyme Activity  
Georgetown University  
The Squibb Institute for Medical Research

RABBITS

Department of Health and Welfare, Vancouver, Canada  
Duke University Medical Center  
Harvard Medical Center  
ICI Americas, Inc.  
National Institutes of Health  
National Institute of Environmental Health Sciences  
Stanford University  
University of Iowa  
University of Mississippi Medical Center  
University of Montreal  
University of Pennsylvania  
University of Rochester  
University of Tennessee Center for the Health Sciences  
University of Western Ontario

Biochemical Damage Indicators  
ICI Americas, Inc.  
National Institutes of Health  
Stanford University  
University of Rochester

Glomerular Dysfunction  
Duke University Medical Center  
Harvard Medical School  
National Institutes of Environmental Health Sciences  
University of Iowa  
University of Mississippi Medical Center  
University of Montreal  
University of Tennessee Center for the Health Sciences

Glomerular Filtration Rate  
Department of Health and Welfare, Vancouver, Canada  
Duke University Medical Center  
Harvard Medical School  
ICI Americas, Inc.  
National Institutes of Health  
National Institute of Environmental Health Sciences  
University of Iowa  
University of Pennsylvania  
University of Tennessee Center for the Health Sciences  
University of Western Ontario

Morphology, Histology  
Harvard Medical School  
National Institute of Environmental Health Sciences  
Stanford University  
University of Montreal  
University of Tennessee Center for Health Sciences  
University of Western Ontario

RABBITS (concluded)

Plasma Renin Measurement  
Duke University Medical Center

Reabsorptive Tests  
University of Mississippi Medical Center  
University of Montreal  
University of Pennsylvania

Renal Blood Flow  
ICI Americas, Inc.  
University of Iowa  
University of Pennsylvania  
University of Western Ontario

Secretive Tests  
Department of Health and Welfare, Vancouver, Canada  
Duke University Medical Center  
ICI Americas, Inc.  
National Institutes of Health  
Stanford University  
University of Iowa  
University of Mississippi Medical Center  
University of Montreal  
University of Pennsylvania

Urinary Concentrating and Diluting Ability  
Duke University Medical Center  
Harvard Medical School  
ICI Americas, Inc.  
University of Iowa  
University of Mississippi Medical Center  
University of Tennessee Center for the Health Sciences

Urinary Enzyme Activity  
National Institutes of Health  
National Institute of Environmental Health Sciences

RATS

Baylor College of Medicine  
Dartmouth Medical School  
Duke University Medical Center  
Environmental Protection Agency  
Food and Drug Research Laboratories  
Georgetown University  
Harvard Medical School  
Department of Health and Welfare, Ottawa, Canada  
Department of Health and Welfare, Vancouver, Canada  
ICI Americas, Inc.  
Indiana University  
Medical College of Virginia  
Michigan State University  
Mount Desert Island Biological Laboratories  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Schering-Plough Corporation  
Smith Kline and French Laboratories  
Southern California Edison Power Company  
The Squibb Institute for Medical Research  
Stanford University  
State University of New York, Stony Brook  
University of Arkansas  
University of Cincinnati Medical Center  
University of Iowa  
University of Mississippi  
University of Montreal  
University of North Carolina  
University of Ottawa  
University of Pennsylvania  
University of Rochester  
University of Tennessee Center for the Health Sciences  
University of Washington  
University of Western Ontario  
Vanderbilt University

RATS (continued)

Biochemical Damage Indicators

Environmental Protection Agency  
Food and Drug Research Laboratories  
ICI Americas, Inc.  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Southern California Edison Power Company  
Stanford University  
State University of New York, Stony Brook  
University of Ottawa  
University of Rochester  
University of Washington

Drug Metabolic Studies

Baylor College of Medicine  
Dartmouth Medical School

General Tubular Damage

Department of Health and Welfare, Ottawa, Canada

Glomerular Dysfunction

Dartmouth Medical School  
Department of Health and Welfare, Vancouver, Canada  
Duke University Medical Center  
Georgetown University  
Harvard Medical School  
Indiana University  
Medical College of Virginia  
Michigan State University  
National Institute of Environmental Health Sciences  
Schering-Plough Corporation  
Southern California Edison Power Company  
The Squibb Institute for Medical Research  
Stanford University  
State University of New York, Stony Brook  
University of Arkansas  
University of Iowa  
University of Mississippi Medical Center  
University of Montreal  
University of Ottawa  
University of Rochester  
University of Tennessee Center for the Health Sciences

RATS (continued)

Glomerular Filtration Rate

Dartmouth Medical School  
Department of Health and Welfare, Vancouver, Canada  
Duke University Medical Center  
Georgetown University  
Harvard Medical School  
ICI Americas, Inc.  
Indiana University  
Medical College of Virginia  
Michigan State University  
National Institute of Environmental Health Sciences  
North Carolina Central University  
Smith Kline and French Laboratories  
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State University of New York, Stony Brook  
University of Cincinnati Medical Center  
University of Iowa  
University of North Carolina  
University of Ottawa  
University of Pennsylvania  
University of Tennessee Center for the Health Sciences  
University of Western Ontario  
Vanderbilt University

Morphology, Histology

Baylor College of Medicine  
Dartmouth Medical School  
Department of Health and Welfare, Ottawa, Canada  
Environmental Protection Agency  
Georgetown University  
Harvard Medical School  
Indiana University  
Medical College of Virginia  
Mount Desert Island Biological Laboratories  
National Institute of Environmental Health Sciences  
Schering-Plough Corporation  
Smith Kline and French Laboratories  
Southern California Edison Power Company  
The Squibb Institute for Medical Research  
Stanford University  
State University of New York, Stony Brook  
University of Cincinnati Medical Center  
University of Houston  
University of Montreal  
University of North Carolina  
University of Rochester  
University of Tennessee Center for the Health Sciences  
University of Washington  
University of Western Ontario

RATS (continued)

Plasma Renin Measurement  
Duke University Medical Center  
Vanderbilt University

Reabsorptive Tests  
University of Mississippi Medical Center  
University of Montreal  
University of Pennsylvania  
University of Rochester

Renal Blood Flow  
Baylor College of Medicine  
Dartmouth Medical School  
Food and Drug Research Laboratories  
Georgetown University  
ICI Americas, Inc.  
Smith Kline and French Laboratories  
The Squibb Institute for Medical Research  
University of Cincinnati Medical Center  
University of Iowa  
University of North Carolina  
University of Pennsylvania  
University of Western Ontario  
Vanderbilt University

Renal Tissue Homogenate Preparations  
Baylor College of Medicine  
Dartmouth Medical School  
University of Western Ontario

Secretive Tests  
Baylor College of Medicine  
Dartmouth Medical School  
Department of Health and Welfare, Ottawa, Canada  
Department of Health and Welfare, Vancouver, Canada  
Duke University Medical Center  
Food and Drug Research Laboratories  
Georgetown University  
ICI Americas, Inc.  
Medical College of Virginia  
Michigan State University  
National Institute of Environmental Health Sciences  
Smith Kline and French Laboratories  
The Squibb Institute for Medical Research  
Stanford University  
State University of New York, Stony Brook  
University of Arkansas  
University of Cincinnati Medical Center  
University of Houston

RATS (concluded)

Secretive Tests - (Continued)

University of Iowa  
University of Mississippi Medical Center  
University of Montreal  
University of North Carolina  
University of Pennsylvania  
University of Rochester  
Vanderbilt University

Urinary Concentrating and Diluting Ability

Dartmouth Medical School  
Duke University Medical Center  
Food and Drug Research Laboratories  
Georgetown University  
Harvard Medical School  
ICI Americas, Inc.  
Indiana University  
Michigan State University  
National Institute of Environmental Health Sciences  
Schering-Plough Corporation  
Stanford University  
State University of New York, Stony Brook  
University of Iowa  
University of Mississippi Medical Center  
University of North Carolina  
University of Tennessee Center for the Health Sciences  
University of Washington

Urinary Enzyme Activity

Baylor College of Medicine  
Environmental Protection Agency  
Food and Drug Research Laboratories  
Georgetown University  
Indiana University  
Medical College of Virginia  
National Institute of Environmental Health Sciences  
North Carolina Central University  
The Squibb Institute for Medical Research  
University of Arkansas

APPENDIX C  
INDEX OF INDIVIDUALS IN THE DIRECTORY

<u>NAME</u>	<u>ORGANIZATION</u>
Agus, Z.S.	University of Pennsylvania
Argy, W.P., Jr.	Georgetown University
Arnold, D.L.	Department of Health and Welfare, Ottawa, Ontario, Canada
Arthaud, L.E.	Schering-Plough Corporation
Berndt, W.O.	University of Mississippi Medical Center
Brennan, F.T.	Smith Kline and French Laboratories
Buckley, J.P.	University of Houston
Burg, M.B.	National Institutes of Health
Chang, L.W.	University of Arkansas
Cherian, G.M.	University of Western Ontario School for Medical Sciences
Clapp, J.R.	Duke University Medical Center
Clark, V.	North Carolina Central University
Clarkson, T.W.	University of Rochester
Cohen, L.	University of Iowa
Collins, B.T.	Department of Health and Welfare, Ottawa, Ontario, Canada
Corcoran, G.	Baylor College of Medicine
Crowe, L.R.	University of Tennessee Center for the Health Sciences

<u>NAME</u>	<u>ORGANIZATION</u>
Dennis, V.W.	Duke University Medical Center
Diamond, L.	Georgetown University
DiFazio, L.T.	The Squibb Institute for Medical Research
Faeder, E.J.	Southern California Edison Power Company
Finn, W.F.	University of North Carolina
Fowler, B.A.	National Institute of Environmental Health Sciences
Garg, R.C.	Ohio State University
Goldforb, S.	University of Pennsylvania
Gottschalk, C.W.	University of North Carolina
Goyer, R.	National Institute of Environmental Health Sciences
Gunman, R.A.	Duke University Medical Center
Hatch, F.E.	University of Tennessee Center for the Health Sciences
Hirsch, G.H.	Department of Health and Welfare, Vancouver, British Columbia, Canada
Hook, J.B.	Michigan State University
Jandhyala, B.S.	University of Houston
Johnson, D.R.	University of Cincinnati Medical Center
Kaloyanides, G.J.	State University of New York, Stony Brook

<u>NAME</u>	<u>ORGANIZATION</u>
Kau, S.T.	ICI Americas, Inc.
King, L.C.	U.S. Environmental Protection Agency, Research Triangle Park
Kleiman, L.I.	University of Cincinnati Medical Center
Kleit, S.A.	Indiana University
Kluwe, W.M.	National Institute of Environmental Health Sciences National Toxicology Program
Koschier, F.J.	Food and Drug Research Laboratories
Kosek, J.C.	Stanford University
Lage, A.L.	Harvard Medical School
Lassiter, W.E.	University of North Carolina
Layton, W.M., Jr.	Dartmouth Medical School
Loomis, T.A.	University of Washington
Luft, F.C.	Indiana University
Mazze, R.I.	Stanford University
McCormack, K.M.	Michigan State University
McGuire, P.F.	Department of Health and Welfare, Ottawa, Ontario, Canada
Mitchell, J.R.	Baylor College of Medicine
Mudge, G.H.	Dartmouth Medical School
Munro, I.C.	Department of Health and Welfare, Ottawa, Ontario, Canada

<u>NAME</u>	<u>ORGANIZATION</u>
Oken, D.E.	Medical College of Virginia
Patel, V.	Indiana University
Plaa, G.L.	University of Montreal
Poutsiaka, J.W.	The Squibb Institute for Medical Research
Powers, J.D.	Ohio State University
Powers, T.E.	Ohio State University
Preuss, H.	Georgetown University
Rickert, D.E.	Michigan State University
Robinson, R.R.	Duke University Medical Center
Sanger, V.L.	Michigan State University
Sastray, B.V. Rama	Vanderbilt University
Schmidt-Nielsen, B.	Mount Desert Island Biological Laboratories
Schreiner, G.E.	Georgetown University
Shaikh, Z.A.	University of Rochester
Singhal, R.L.	University of Ottawa
Singhvi, S.M.	The Squibb Institute for Medical Research
Stavric, B.	Department of Health and Welfare, Ottawa, Ontario, Canada
Steenberg, M.L.	University of Houston
Valtin, H.	Dartmouth Medical School
Wiebelhaus, V.D.	Smith Kline and French Laboratories

<u>NAME</u>	<u>ORGANIZATION</u>
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Woods, J.S.	National Institute of Environmental Health Sciences
Zeman, W.	Indiana University

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